NUMBER OF BARKBEETLES IN FLIGHT--A BASIS FOR DETERMINING INFESTATION TRENDS

Purpose

A convenient, inexpensive, and relatively accurate means of determining the population trend of bark beetles from season to season as a reliable guide to decisions on the necessity for suppressive measures is highly desirable. At present, and for the many years that control work has been practiced, the criteria for judging the course of any given infestation have relied almost entirely on loss trend or number of trees killed, and certain ecological factors which are presumed to affect host resistance to attack.

These criteria are inadequate, and for a number of years attempts have been made to strengthen them. The most hopeful approach is to secure a quantitative measure of maturing populations as an index. In general this is done through sampling of infested trees and making counts of mature brood in a given area of bark, or securing emergence data from samples in rearing. Various bark areas, locations on an infested tree, and number of trees have been considered, and as yet there is no reasonable assurance of the adequacy of any given technique or procedure as a true measure of the epidemiology of a given bark beetle species. Nor does it seem possible to secure an adequate sample by this means because of time requirements and attendant costs.

It is evident, therefore, that other means of populations sampling must be developed if this criterion is to be used successfully. This may be done through an entirely different approach, and one that will have to be developed. Basically, the approach as proposed below depends on a measure of barkbeetle populations in flight by different seasonal generations, from season to season.

Objective

To determine if barkbeetle infestation trend (epidemiology) can be measured from quantitative adult flight data and whether this information may be used as a basis for control planning.

Background

Observations and experimental tests covering over 40 years have shown that D. brevicomis adults respond positively to light in their flight behavior during daylight hours after they emerge as new adults. The same response has been observed among practically all of the barkbeetle species. However, no tests have yet been conducted to measure quantitatively adult populations in flight during any given season or for a single generation. This information should be quite simple to obtain through the development of field techniques with daylight reflectors, and provision for their maintenance from season to season.

Proposed technique

To develop a simple means of trapping adults in flight through use of light reflectors such as white or brightly colored cloth or paper erected in the vicinity of known infestations. Tests should be made with a number of colors with white as a standard of comparison. They should include especially yellow, orange, red, and blue, each set up under the different cardinal directions, but having similar daylight intensity. The size of any given light reflector should be not less than 6' X 6'. They should be attached to a rigid frame which can be set up vertically. The surface texture should vary to determine the efficiency of a given reflector to hold attracted beetles or a need for developing supplementary trapping methods. For example, if beetles in flight land against a smooth surface then drop because

they cannot adhere to it, then an aqueous container to trap the beetles as they drop could be developed if high efficiency of the reflector is shown. Records should be kept of air temperature and wind movement since these factors in addition to light are most likely to influence flight behavior.

Applications

Detailed plans for measuring adult populations will depend on the outcome of results developed by testing out the above techniques. In the event that a technique and materials are found that will show promise of success, then broad applications can be made under the many varying conditions of a forest type and the different barkbeetle species involved. This information can then be put to use in accordance with the objective of this study. The positive phototropic behavior of barkbeetles gives strong promise that this approach at determining epidemiology trends can be accomplished successfully, and because of its possible use as a superior tool in advising on control procedure is well worth a try.

G. R. Struble

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